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ABSTRACT

Uses of personal computers, or microcomputers (micros), by college business offices are discussed, with attention to safeguards. An advantage of using micros is that business officers can develop their own applications with purchased software and need not depend on the data processing staff. The micros, which are located in the business office and are under its control, can be used for word processing or to develop and maintain work schedules, critical path analyses, and personal appointment calendars. Graphics software can aid in the preparation of many documents, and spreadsheet software creates an accountant's worksheet or matrix on the video display screen. Micros can also be used by administrators for budget modeling to create budget guidelines, and for special reports, including gift campaign summaries, unrestricted gifts and pledges, construction projects, debt service requirements, and present-value calculations for capital budgeting. Although a school should maintain most of its database on its mainframe computer or in a distributed data system network, administrators can use personal computers for selected data files. An example of a spreadsheet for the allocation of plant operation and maintenance costs to benefit cost objectives is included. (SW)

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Personal Computers in the Business Office

by KEITH W. MATHEWS

Many college and university business officers are acquiring personal computers (i.e., microcomputers). The author recently took an informal survey at three NACUBO workshops attended by chief business officers, controllers, planning and budget directors, accountants, and analysts. Nearly half of those in attendance used a microcomputer on the job.

Conversations with these people during breaks and meals indicated a variety of uses, the biggest by far being the electronic spreadsheet. Other uses mentioned were word processing, scheduling, graphics, and electronic mail (which requires a network of microcomputers). The other applications can be done on one machine unless sheer volume makes it necessary to use more. These applications are not unique to college business officers. In fact, they mirror developments in business and government. The various journals devoted to accounting and administration management have told of similar developments in all kinds of organizations.

Users cite a number of reasons for the popularity of microcomputers. In comparison to mainframe computers and minicomputers, they are inexpensive and "user-friendly." They serve one user at a time and do one job at a time. Business officers can develop their own applications with purchased software and need not depend on the data processing staff. The micros are located in the business office and are under its control.

A personal computer that would be adequate for office use sells for about $4,000-$5,000, although larger models costing $10,000 and more are available. A desirable configuration would include the processor, keyboard, video display, two disk drives, and a printer. The printer may be dot-matrix (cheaper) or letter-quality (better but more expensive). Personal computers are available in stores operated by manufacturers and in independent stores that carry a variety of makes. *The Chronicle of Higher Education* recently reported that colleges and universities increasingly tend to negotiate directly with manufacturers for substantial discounts on large quantities of micros.

Many types of software packages are available for most micros. These include operating systems, Basic, spreadsheets, graphics, communications, and specialized applications such as accounts receivable and inventory. Prices typically range from $100 to $500. Software comes on diskettes accompanied by detailed instruction manuals and tutorials. Illustrative examples on diskette are sometimes included.

For colleges and universities, the personal computer is a supplement to the mainframe or minicomputer, not a substitute. Micros have smaller memories and less disk space, as well as slower processing speeds. Only a very small organization can use one for payroll, billing, budget reports, and other jobs that require integrated data files and that have a sizable printed output.

Microcomputer Uses

Most business officers are familiar with word processing, a well-established concept of typing in an electronic medium that facilitates the correcting and editing of text. The distinction between word processors and computers is now disappearing. With word processing software and a letter-quality printer, a personal computer can produce memos, letters, and reports. While business officers are not usually interested in doing their own typing, some are using the micros capability in order to prepare initial drafts of financial or technical reports, or to revise or rearrange reports already stored on diskette.

Some business officers use microcomputer software to develop and maintain work schedules, critical path analyses, or their own personal appointment calendars. (Administrators and secretary can share personal computers.)

Graphics software for the microcomputer can aid in the preparation of many documents. Separate graphics packages are available, and some new products incorporate graphics with spreadsheets.

Spreadsheets are the most popular of the microcomputer applications. Spreadsheet software creates an accountant's worksheet or ma-

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trix on the video display screen. The worksheet contains columns and rows identified by letters and numbers. A column letter and row number together identify a specific position on the worksheet. The user can enter data in any position. The data can be words, numbers, or formulas. The latter can contain actual numbers, worksheet positions, or both. The software will execute the formulas and display the results on the screen. When worksheet positions are used in a formula, the numbers contained in those positions become part of the formula. If the user changes that data, the software recalculates the formula and displays the new results.

Below is an example based on VisiCalc, the original spreadsheet package released in 1979. The user loads the program by inserting the diskette, and sees:

	A	B	C	D	E	F	G	H
1								
2								
3								
4								

He or she types in:

	A	B	C	D	E	F	G	H
1		3						
2		2						
3								
4		+B1+B2						

The screen displays:

	A	B	C	D	E	F	G	H
1		3						
2		2						
3								
4		5						

If the user changes the 3 to a 4, the total will automatically change to 6.

It is the recalculation of formulas containing positions that makes the spreadsheet a powerful productivity tool. The user can readily correct errors, update reports stored on diskettes, and do modeling with numerous "what if" assumptions. The software contains commands for printing, formatting, moving, and deleting data, for repeating formulas across a row or down a column, and for numerous mathematical and logical functions. Common arithmetic signs are used to construct formulas.

The accompanying illustration is based on an example in NACUBO's *Cost Accounting Handbook for Colleges and Universities*. In the example, plant operations and maintenance costs are being allocated to the other functional expenditure categories on the basis of square feet. The first set of figures (dated 1982-83) comes from the handbook, but the allocation and percentage columns result from formulas stored in the electronic spreadsheet. To redo the allocation a year later, for 1983-84, the analyst would reload the data from a storage diskette, update the square feet and cost numbers, and let the program recalculate the allocations and percentages. In Exhibit 1, plant O&M cost and the square feet for student services and instructions were changed—a five-minute job. A 200-line report would not take much longer to change.

The column and row designations always appear on the screen but they do not print on reports. In Exhibit 1, the square feet figures are in column E, lines 22 through 28, with the total at E30. The spreadsheet actually contains a sum command at E30, sum (E22 . . . E28). The plant O&M cost is at F21.

The allocations are at G22 through G28. Location G22 contains the formula +E22/E30*F21. The slash (i.e., "/") means divide and the asterisk means multiply. Locations G23 through G28 contain similar formulas, derived from a repeat command rather than individually typed. A sum command produced the total.

The percentages are in column H. Location H22 contains +G22/G30*100. Again, similar formulas and a sum command complete the column.

The program used for the above illustration was, again, VisiCalc, one of many such packages now available. Most claim some unique feature. The older products have spreadsheet capability only. Newer ones add other features. The first combination package was Lotus 1-2-3. Released in late 1982, it combines the spreadsheet with graphics capability and data-base management. In 1983 came a still more

Exhibit 1: Spreadsheet Example

ALLOCATION OF PLANT OPERATION AND MAINTENANCE COSTS TO BENEFITING COST OBJECTIVES

1982–83

Cost Objective	Square Feet	Cost	Allocation	%
Plant O&M		1125691		
Institutional support	36000		115127	10
Academic support	20000		63960	6
Student services	24000		76752	7
Instruction	180000		575637	51
Public service	4000		12792	1
Research	8000		25584	2
Auxiliary enterprises	80000		255839	23
Totals	352000		1125691	100

ALLOCATION OF PLANT OPERATION AND MAINTENANCE COSTS TO BENEFITING COST OBJECTIVES

1983–84

Cost Objective	Square Feet	Cost	Allocation	%
Plant O&M		1189420		
Institutional support	36000		115727	10
Academic support	20000		64293	5
Student services	27000		86796	7
Instruction	195000		626856	53
Public service	4000		12859	1
Research	8000		25717	2
Auxiliary enterprises	80000		257172	22
Totals	370000		1189420	100

sophisticated product, VisiOn, which adds word-processing and query capability and has its own operating system for integrating the different applications.

Administrators who use electronic spreadsheets generally type in the data and formulas themselves or ask a clerical employee to do it. A few software products are now available to link personal computer spreadsheets with mainframe computer disk files. The user can formulate a query statement to extract data from a master file and can then transfer that data directly into a spreadsheet. However, these packages currently are limited to use with particular disk file structures. They are also quite expensive, $25,000 and up.

A business manager could use a spreadsheet package for any worksheet or report draft that he or she would previously have done in pencil on columnar paper. Common sense should prevail. Pencil and paper are still appropriate for small, simple jobs. The bigger the job gets, particularly with regard to calculations and subtotals, the more likely it is to be a sensible microcomputer application. If it is repetitive and not programmed on the university's main computer, it is an excellent application.

The balance of this article contains real-life examples of microcomputer spreadsheet applications in the business office of a small, independent university. All are drawn from the author's experience.

Budget Modeling

A budget model helps top administrators develop budget guidelines. The model is an informal and condensed version of the budget itself and, if the model is set up on a computer, administrators can change the variable factors repeatedly to see the results under a wide variety of assumptions. This is the process of asking the "what if" questions referred to in much of the management literature. In a decade when the size of the college-age population is declining, a multiyear model can detect financial and operating problems while there is still time to deal with them.

Budget models can run on either mainframe computers or micros. Modeling software packages for mainframes tend to be relatively expensive and complex. The electronic spreadsheets can get the job done on a micro. The author's spreadsheet budget model contains the following components:

- Freshman class enrollment
- Retention factors by class
- Sophomore, junior, and senior class enrollments
- Housing and dining capacities and ratios
- Students housed and fed
- Students on financial aid
- Desired student-faculty ratio
- Faculty size
- Desired staff size—administrative, clerical, maintenance
- Student fees—tuition, room, board
- Average student financial aid
- Average compensation rates by class of employee
- Endowment principal
- Endowment rate of return—total, reinvested, distributed for current use
- Revenues—detailed list and total
- Expenditures—detailed list (by object) and total
- Net revenues or expenditures

The model is a big one, with over 200 lines and columns for the current year and for three to ten future years. Formulas based on worksheet position link all related items. If one item is changed, the program automatically recalculates everything else. Despite the size of the model, recalculations take only seconds.

A second model supports the critical factor of freshman class enrollment. Much smaller than the budget model, it contains data on projected high school graduates in the states from which the university draws most of its enrollment, along with market-share percentages by state. Another supporting model, highly detailed, contains the number of authorized faculty, administrative, clerical, and maintenance positions by department.

The budget model gets peak use when the administration is preparing budget guidelines, but the university's planning commission uses it year-round. Sometimes three or four top officers stand at the video display screen anxiously awaiting the latest recalculation. Trustees receive printouts to guide them when they are considering budget proposals.

Budget modeling has been, for the author's university, the most valuable application of the microcomputer and the spreadsheet software.

Accounting Reports And Worksheets

The university's mainframe computer produces a large set of routine monthly reports. These include transaction lists, department budget control reports, budget summaries based on the principles of responsibility accounting, grant reports, analyses of unexpended plant funds, gift and pledge reports, and detailed and condensed balance sheets. Still, ad hoc analyses not adequately covered by the routine output are also needed.

Two computer tools are available for special reports—the mainframe report generator program and the personal computer spreadsheet. Of course, paper and pencil are also an option.

Microcomputer reports have included the following:

- Gift campaign summaries
  - Gifts and pledges by fund group and in total—cumulative for a multiyear campaign
    - -Goal
    - -Received
    - -Needed
- Unrestricted gifts and pledges report
  - Received
  - Appropriated—amount and description in detail
  - Available
- Construction projects summary
  - Description
  - Appropriation
  - Expended—prior years
  - Expended current year to date
  - Unexpended appropriation

Estimate to complete
Amount over or under appropriation

○ Debt service requirements—U.S. government residence hall bonds, five-year period
Principal
Interest
Required reserve balance
Required deposit

○ Present-value calculations for capital budgeting

The electronic spreadsheet also speeded up the year-end closing in 1983 and 1984. Accounting personnel used it to construct worksheets for the preparation of the formal financial statements. The auditors received copies of the worksheets for their papers while they were still conducting their field work. Those copies reduced the amount of time the auditors spent cross-referencing the statement drafts.

The worksheets were similar to those illustrated in accounting principles textbooks. They contained columns for account numbers, financial statement captions, balances per books, adjusting entries, reclassifications, groupings, and financial statement balances. Line items were the captions used in each of the financial statements (e.g., cash, accounts receivable, tuition, instruction). Formulas containing worksheet positions were used to calculate the financial statement balances. Any further adjustments were thus easier to make.

Data Files

A university should maintain most of its data base on its mainframe computer or in a distributed data system network. Much of the data base is interrelated, so separate files on separate small machines would reduce data processing effectiveness and efficiency. Decentralized data bases also encourage the creation of duplicate files in separate locations. Duplicate files tend to become different files in time, as control over the accuracy of data becomes diffused. Therefore, business officers should generally discourage the use of microcomputers for the maintenance of data files.

Articles in data processing periodicals indicate that backlog in systems development is a widespread problem. Business officers and other administrators can help overcome that backlog with the judicious use of personal computers for selected data files. These files should be for stand-alone applications (i.e., applications that do not require the integration of broad types of data). They should also be comparatively small because of the microcomputer's size limitations.

The author has developed two such files so far, one using the electronic spreadsheet and the other using a purchased applications program. The spreadsheet file contains investment pool shares. The purchased system is for miscellaneous accounts receivable from a small number of employees and other individuals (excluding students) and from student organizations such as sororities, fraternities, clubs, and student government.

The investment pool file is subsidiary to the endowment, quasi-endowment, and annuity capital sections of the general ledger. Individual capital accounts "own" shares in one or more investment pools. Additions to or deletions from individual capital accounts result in increases or decreases in shares owned, based on the market value per share at the beginning of the calendar quarter within which the transaction takes place. Distributions of income among unrestricted and restricted purposes are based on the shares owned by the various capital accounts and on the restrictions placed on the use of income by the donors.

Income distributions, followed by updates, occur quarterly. The spreadsheet contains the following columns:

○ Account title
○ Account number
○ Dollar amount added
○ Dollar amount deducted
○ Ending dollar balance
○ Shares bought—formula: dollar amount added or deducted divided by share price
○ Shares sold
○ Ending share balance
○ Income distribution account number
○ Amount of income distribution—formula: ending share balance multiplied by income per share.

The quarterly income distribution is done first, using income per share for the quarter (entered at the top of the worksheet) and the ending share balances from the previous quarter. A printout of the distribution serves as a journal entry in the university's accounting system. Then comes the update of additions and deletions, with the current share price entered at the top of the worksheet.

The purchased accounts receivable software can handle up to 500 accounts in the subsidiary ledger. The software produces a detailed listing, billing statements, and an account distribution for entry into the accounting system.

Conclusion

Certain safeguards are necessary with personal computer use. Accountants should use predetermined control totals and balancing procedures as they do in all their work. A review of the screen for "garbage" or error messages is a must before printing. Backup diskette copies are also necessary, since users can destroy diskette files by typing incorrect storage commands or by physically damaging the diskette. Users should store data on diskette every half hour or less so they do not lose several hours' work through error or machine failure. Hardware should be purchased from only one or two manufacturers, both to get better prices and to facilitate repairs and shared usage when breakdowns occur.

With these safeguards personal computers can be a significant productivity tool in the college or university business office. Applications can include word processing, scheduling, spreadsheets and graphics for budget modeling; accounting reports and worksheets; and small, stand-alone, data files. Many business officers, recognizing the value of these applications, are acquiring personal computers for use in carrying out their responsibilities. ♦

business officer

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